

"TRADER" SERVICE SHEET

1287

# AMBASSADOR AFM/TM

Covering Table Model AFM/TM, Console Model AFM Bookshelf, Auto-radiogram Models AFM Radiogram, CRG/AFM, PRG/AFM

**T**HE Ambassador AFM/TM is a 5-valve (plus rectifier) 3-band A.M./F.M. table receiver, designed to operate from A.C. mains of 200-250 V, 50 c/s. The band ranges are: A.M., 180-550m and 1,000-2,000m; F.M., 88-100 Mc/s.

The AFM Bookshelf is a console receiver, and the CRG/AFM, PRG/AFM, Consort and AFM Radiogram are 3-speed auto-radiograms. All models employ an AFM/TM chassis.

**Release dates and original prices:** AFM/TM, May 1955, £19 11s 4d; AFM Bookshelf, May 1955, £26 1s 9d; CRG/AFM, February 1956, £52 3s 6d; PRG/AFM, February 1956, £57 15s 9d; Consort, June 1956, £38 0s 11d; AFM Radiogram, May 1955, £47 16s 6d. Purchase tax extra.

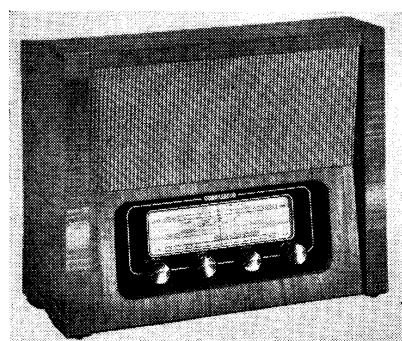
## CIRCUIT DESCRIPTION

A.M. aerial input is coupled to the aerial tuning circuits by L10 (M.W.) and by the common impedance of C18 (L.W.). I.F. rejection in the aerial input circuit by L9, C17. V2b operates as A.M. mixer and V2a operates as local oscillator.

Oscillator grid coils L13 (M.W.) and L14 (L.W.) are tuned by C27. Parallel trimming by C28 (M.W.) and C29, C30 (L.W.); series tracking by C33 (M.W.) and C32, C33 (L.W.). Reaction coupling from oscillator anode via L15 and the common impedance of trackers C32, C33. V3 is a variable-mu R.F. pentode operating as A.M. intermediate frequency amplifier with tuned transformer couplings L18, L19 and L23, L24.

**A.M. intermediate frequency 470 kc/s.**

Diode section C of V4 operates as signal detector. Audio frequency component in its recti-



Appearance of the Ambassador AFM/TM.

fied output is developed across R19 and is passed via R21, C52, volume control R22 and C53 to V4d which operates as A.F. amplifier. I.F. filtering by C47, R16, C48, R21, C51.

D.C. component developed across R19 is fed back as bias to V2b and V3 giving automatic gain control on the A.M. bands.

Provision is made for the connection of a gramophone pick-up across the volume control circuit via S19 which closes in the gram position of the band switch. S11, S14 and S15 close and S18 opens in this position to prevent radio breakthrough.

Resistance-capacitance coupling by R25, C56, R26, R27, between V4d and pentode output valve V5. Variable tone control in V5 control grid circuit by C57, R28. Tone correction in V5 anode circuit by C58.

H.T. current is supplied by I.H.C. full-wave rectifier V6. Smoothing by R31, L27 and electrolytic capacitors C60, C61, C63.

## Operation on F.M.

80Ω co-axial F.M. aerial input via L1, L2 to earthed grid R.F. amplifier, section a of V1. V1b operates as oscillator/mixer valve with tuned oscillator anode circuit L5, C11, C12, C13, C14. Reaction coupling from oscillator grid circuit via L4.

Output of V1a is coupled via R.F. tuning circuit L3, C4, C5, C6 and a tapping on L4 to V1b. Oscillator radiation is kept to a minimum by means of a bridge neutralizing circuit, formed by L4, C9 and the grid/cathode capacitance of V1b, which prevents oscillator voltages from passing back into the R.F. and aerial circuits.

F.M. tuning is by means of C5 and C12 which are parts of the main tuning gang.

V2b and V3 form the two-valve F.M. intermediate frequency amplifier, which is coupled by tuned transformers L7, L8; L16 L17; and discriminator transformer L20, L21, L22 to diode sections a and b of V4 connected in a ratio detector circuit.

**F.M. intermediate frequency 10.7 Mc/s.**

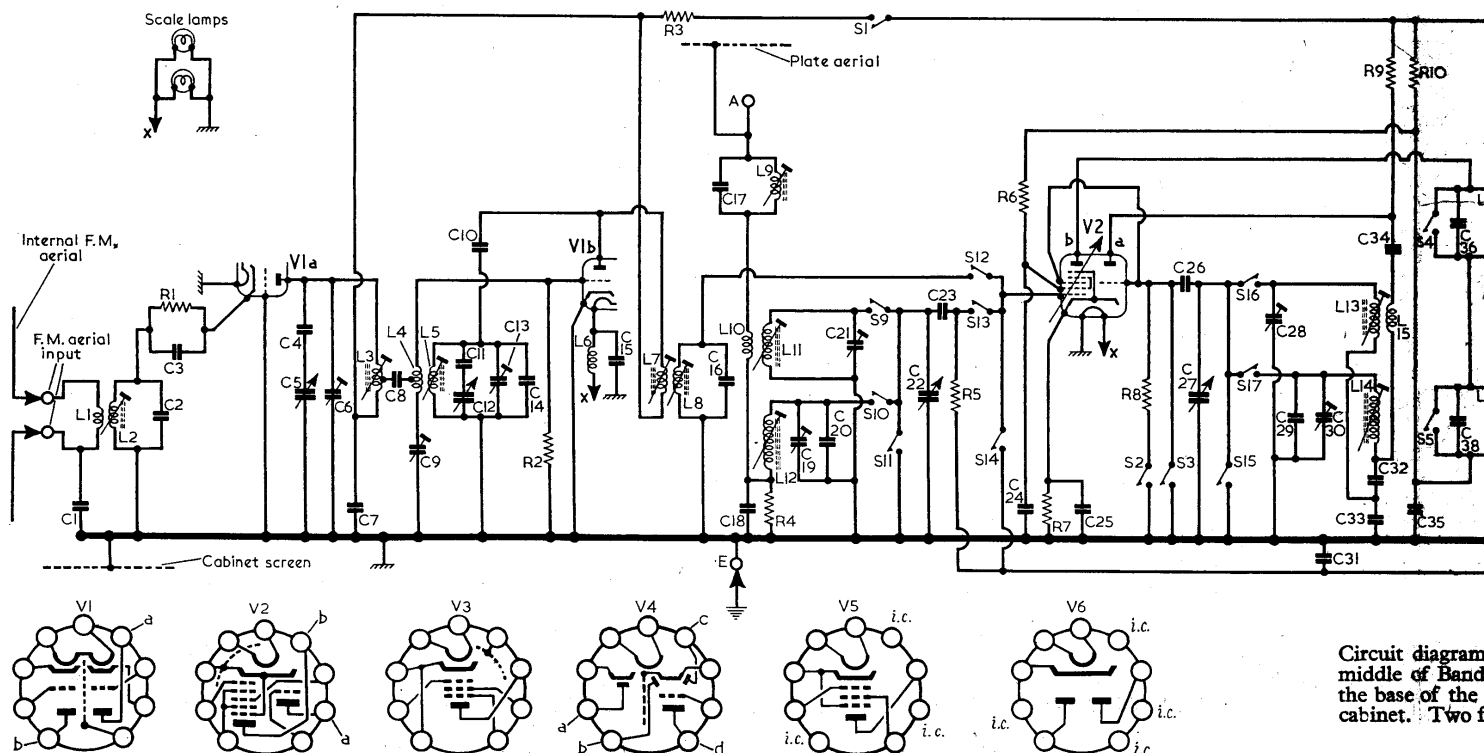
The A.F. output of the ratio detector is developed across A.F. load C44 and is passed via de-emphasis circuit R15, C50, R18 to the volume control circuit. Limiting is by means of the flywheel effect of D.C. reservoir capacitor C49.

## MODIFICATIONS

The following modifications occur in later models than the sample receiver from which this Service Sheet was prepared.

**V2b.**—A 2pF capacitor is connected between V2b control grid and the junction of R6, R10. C35 is 0.001μF and is returned to V2b cathode instead of to chassis.

**V3.**—A spare contact on the slide-type A.M./



Circuit diagram middle of Band the base of the cabinet. Two ft

# A/TM Series

AFM Bookshelf, and 3-speed  
AFM, PRG/AFM and Consort

F.M. switch unit is used to shunt an 0.005 $\mu$ F capacitor across C40 on A.M. operation. This additional switch is identified as S22 in location reference G4 in the underside view of the chassis. C40 is 0.002 $\mu$ F. R11 is connected directly to H.T. positive. C42 is 0.01 $\mu$ F and is returned to V3 screen grid instead of to cathode.

**Tone Control Circuit.**—C57 is omitted and R28 is connected, via a 460pF or a 500pF capacitor to V5 anode. The top of R28 is also connected via a 470k $\Omega$  resistor to R26, R27. C58 is 0.002 $\mu$ F.

**Discriminator Circuit.**—R18 is omitted. C50 is 0.001 $\mu$ F and is connected between R15, S7 and chassis. R20 is 22k $\Omega$ .

**H.T. Circuit.**—L27 is connected to the junction of C60, R31 instead of to the junction of R31, C61.

**AFM Bookshelf.**—In later versions of this model, a 470k $\Omega$  resistor is connected in series between C52 and R22 and a 625pF capacitor and a 330k $\Omega$  resistor connected in series are shunted from the top of R22 to chassis.

## Earlier Versions

The following differences occur in earlier models than our sample receiver.

R6 was connected direct to H.T. positive. R18 was omitted. C50 was 300pF and was connected direct to chassis. A 47k $\Omega$  resistor was connected between R15, C50 and S7. C62 was omitted.

## GENERAL NOTES

**Switches.**—S1-S8 are the A.M./F.M. change-over switches ganged in a slide-type unit beneath the chassis. The switch contacts on this unit are identified in the underside illustration of the chassis (location references F4, G4, H4). Switches S2, S4 and S8 close for A.M. operation, and switches S1, S3, S5, S6 and S7 close for F.M. operation.

S9-S19 are the band/gram switches ganged in a single rotary unit beneath the chassis. This (Continued column 1 overleaf)

## COMPONENT VALUES AND LOCATIONS

### Capacitors

C1	0.003 $\mu$ F	A2
C2	6pF	A2
C3	0.002 $\mu$ F	A2
C4	50pF	A2
C5	—	A1
C6	—	J4
C7	500pF	J4
C8	50pF	J4
C9	—	J4
C10	15pF	J4
C11	50pF	A2
C12	—	A1
C13	—	J4
C14	6pF	J4
C15	0.002 $\mu$ F	J4
C16	15pF	B2
C17	500pF	A2
C18	2,400pF	J3
C19	—	A1
C20	60pF	J3
C21	—	A1
C22	—	A1
C23	100pF	H4
C24	0.05 $\mu$ F	H4
C25	0.05 $\mu$ F	H4
C26	100pF	H4
C27	—	A1
C28	—	B1
C29	140pF	H3
C30	—	B1
C31	0.1 $\mu$ F	G3
C32	300pF	H3
C33	550pF	H3
C34	100pF	H3
C35	0.01 $\mu$ F	H4
C36	15pF	B2
C37	15pF	B2
C38	175pF	B2
C39	175pF	B2
C40	0.01 $\mu$ F	G4
C41	0.01 $\mu$ F	G4
C42	0.003 $\mu$ F	G4
C43	30pF	C2
C44	300pF	F4
C45	175pF	C2

### Resistors

R1	220 $\Omega$	A2
R2	1M $\Omega$	J4
R3	2.2k $\Omega$	H4
R4	10k $\Omega$	J3
R5	470k $\Omega$	H4
R6	39k $\Omega$	H4
R7	180 $\Omega$	H4
R8	47k $\Omega$	H4
R9	39k $\Omega$	H4
R10	2.2k $\Omega$	H4
R11	68k $\Omega$	G4
R12	150 $\Omega$	G4
R13	2.2k $\Omega$	G4
R14	1.2k $\Omega$	F3
R15	47k $\Omega$	F4
R16	47k $\Omega$	F4
R17	1.5M $\Omega$	G4
R18	22k $\Omega$	F4
R19	470k $\Omega$	F4
R20	56k $\Omega$	G3
R21	47k $\Omega$	H3
R22	1M $\Omega$	G3
R23	10M $\Omega$	G3
R24	150k $\Omega$	G3
R25	100k $\Omega$	G3

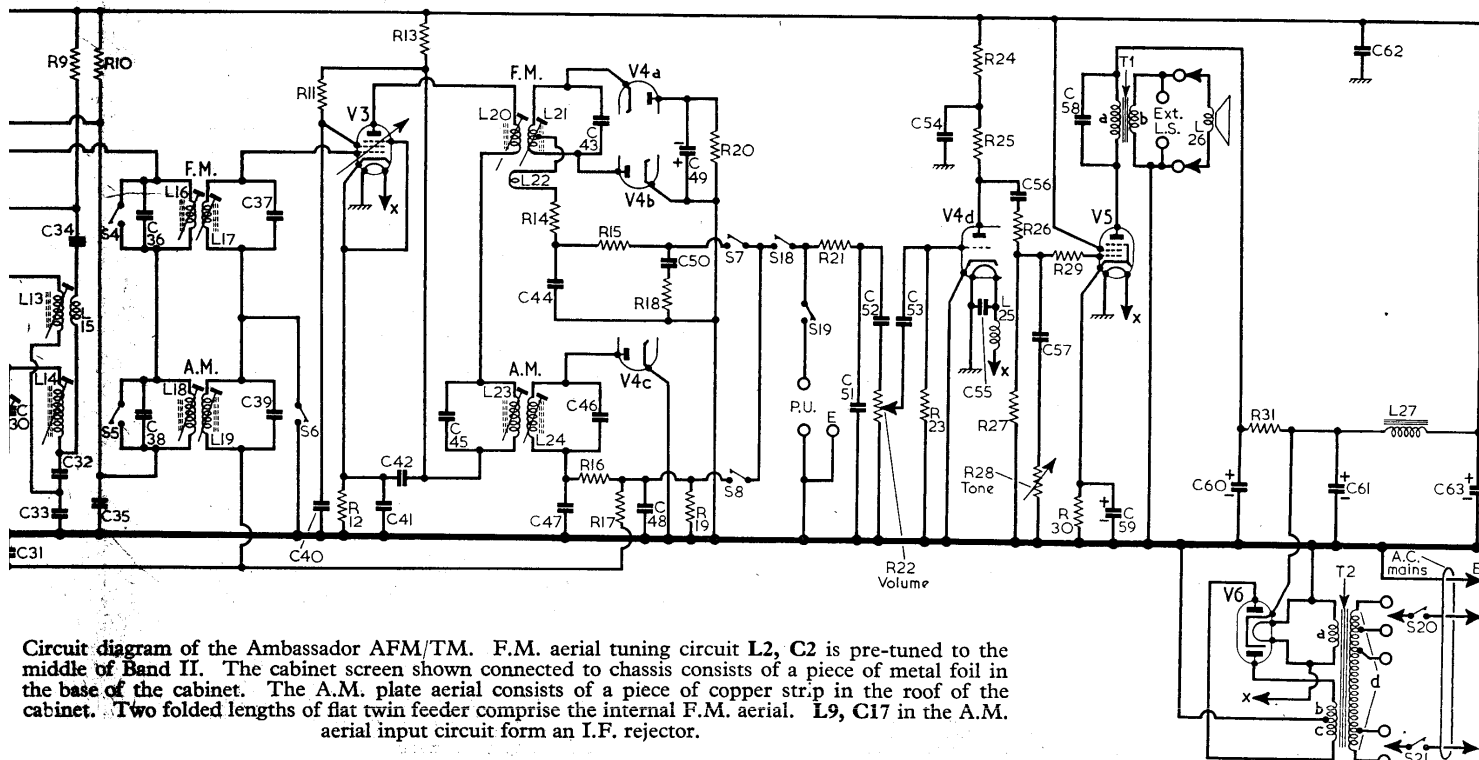
### Other Components

L1	—	A2
L2	—	A2
L3	—	J4
L4	—	J4
L5	—	J4
L6	—	H4
L7	—	B2
L8	—	B2
L9	3.0	A2
L10	8.0	J3
L11	3.0	J3
L12	25.0	J3
L13	2.0	H3
L14	5.0	H3
L15	—	H3
L16	—	B2
L17	—	B2
L18	10.0	B1
L19	10.0	B1
L20	2.0	C2
L21	—	C2
L22	—	C2
L23	10.0	C2
L24	10.0	C2
L25	—	F3
L26	2.5	—
L27	400.0	B1
T1	{ a 430.0 } { b 0.5 } { c }	E3
T2	{ a 190.0 } { b 200.0 } { c 43.0 }	D1
S1-S8	—	G4
S9-S19	—	H4
S20, S21	—	F3

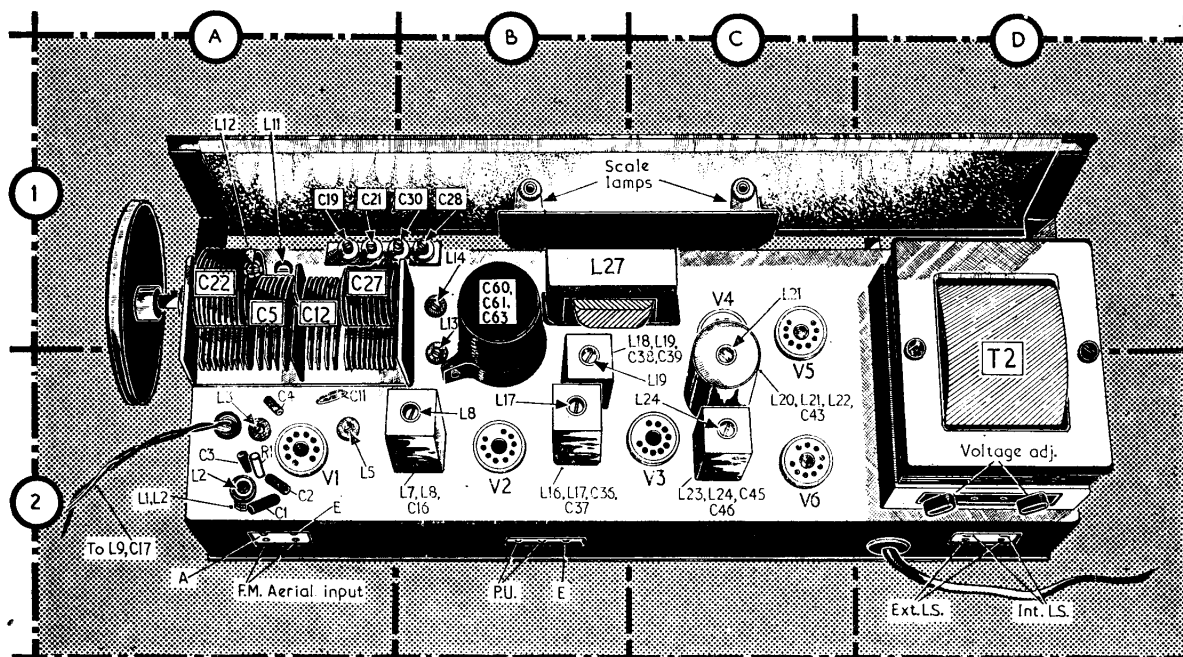
<sup>1</sup>May be 0.001 $\mu$ F.

<sup>2</sup>Approximate D.C. resistance in ohms.

If component numbers given in the table above are quoted when ordering replacement parts, the fact should be mentioned on the order, as these numbers may differ from those used by the manufacturers.



Circuit diagram of the Ambassador AFM/TM. F.M. aerial tuning circuit L2, C2 is pre-tuned to the middle of Band II. The cabinet screen shown connected to chassis consists of a piece of metal foil in the base of the cabinet. The A.M. plate aerial consists of a piece of copper strip in the roof of the cabinet. Two folded lengths of flat twin feeder comprise the internal F.M. aerial. L9, C17 in the A.M. aerial input circuit form an I.F. rejector.



Plan illustration of the chassis. The A.M. I.F. filter **L9, C17**, whose leads are indicated in location **A2**, are mounted in the cabinet.

### General Notes—Continued

unit is indicated in the underside illustration of the chassis (location reference J4), and is shown in detail in the diagram in this column where it is drawn as viewed from the rear of an inverted chassis. The associated switch table gives the switch operations in the four control settings, starting with the control turned fully anti-clockwise. A dash indicates open, and C, closed.

**Scale Lamps.**—These are 6.3 V, 0.3 A lamps, with small clear spherical bulbs and M.E.S. bases.

**Drive Cord Replacement.**—About 55 in of nylon-braided glass yarn is required for a new drive cord. It should be run as indicated in the sketch of the tuning drive system at the head of columns 5 and 6, starting with the gang at maximum capacitance and tying the cord to the lug on the drum as shown.

## VALVE ANALYSIS

Valve voltages and currents in the table (next col.) are those measured on our sample receiver when it was operating from A.C. mains of 240 V, with the voltage adjustment plugs set to the

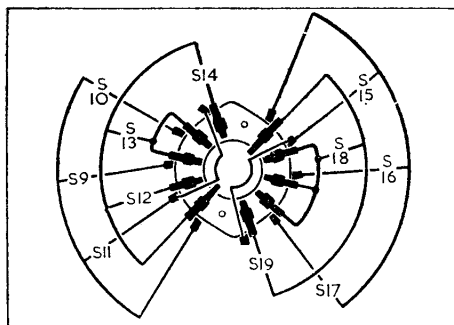
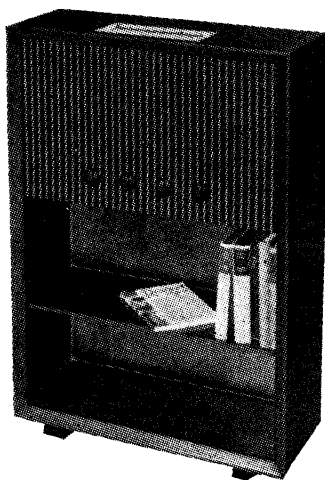


Diagram of the band/gram switch unit as seen from the rear. Below is the associated switch table.

Switches	Gram.	L.W.	M.W.	F.M.
S9	—	—	<b>C</b>	—
S10	—	<b>C</b>	—	—
S11	<b>C</b>	—	—	<b>C</b>
S12	—	—	—	<b>C</b>
S13	—	<b>C</b>	<b>C</b>	—
S14	<b>C</b>	—	—	—
S15	<b>C</b>	—	—	<b>C</b>
S16	—	—	<b>C</b>	—
S17	—	<b>C</b>	—	—
S18	—	<b>C</b>	<b>C</b>	<b>C</b>
S19	<b>C</b>	—	—	—



Appearance of the Ambassador AFM  
Bookshelf receiver.

appropriate tapings. The gang was tuned to maximum, and, except where otherwise indicated, the receiver was switched to F.M. There was no signal input.

Valve voltages were measured with an Avo Electronic Testmeter, and as this instrument has a high internal resistance, allowance should be made for the current drawn by other types of meter. Chassis was the negative connection in every case.

Valve	Anode		Screen		Cath.
	V	mA	V	mA	V
V1 ECC85					
a ...	230	7.9	—	—	0.08
b ...	230	14.8	—	—	—
V2 ECH81 <sup>1</sup>					
a ...	86	4.9	—	—	1.65
b ...	250	2.0	83	4.6	1.65
V3 6F85	235	8.3	95	2.15	1.4
V4 EABC80					
a-c					
d ...	75	0.8	—	—	—
V5 EL84	250	36.0	258	4.0	8.2
V6 EZ80	243 <sup>2</sup>	—	—	—	258.0 <sup>3</sup>

<sup>1</sup>Receiver switched to A.M.

<sup>2</sup>A.C. reading each anode.

<sup>3</sup>Cathode current 73 mA.

## CIRCUIT ALIGNMENT

**Equipment Required.**—An A.M. signal generator covering 160 kc/s-1.5 Mc/s, 10.7 Mc/s and 88 Mc/s -96 Mc/s; a 0-10 V high resistance D.C. voltmeter; a 0-2.5 V A.C. valve voltmeter; a damping unit consisting of a 470 $\Omega$  resistor and an 0.002 $\mu$ F capacitor connected in series; a 47k $\Omega$  resistor.

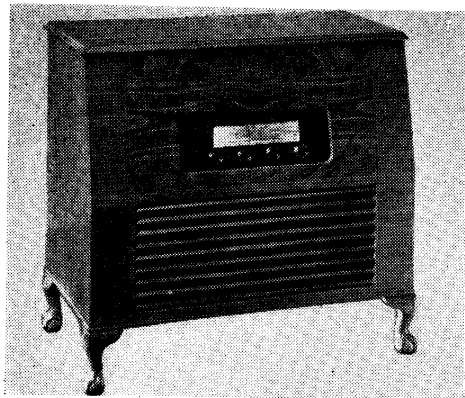
The tuning scale should be removed from the cabinet and placed in position over the control spindles. Check that with the gang at maximum capacitance, the cursor coincides with the diamonds at the high wavelength ends of the tuning scales.

### F.M. I.F. Stages

- 1.—Connect 0-10V meter across **R20**, taking the positive lead to chassis and connecting the negative lead via the 47k $\Omega$  resistor to the top of **R20** (location reference G3).
- 2.—Connect signal generator between chassis and control grid (pin 2) of **V2b**, switch receiver to F.M. Feed in a 30% modulated 10.7 Mc/s signal and adjust output of signal generator to produce a reading of 1V to 2V on the output meter.
- 3.—Adjust the core of **L20** (G4) for maximum output on meter.
- 4.—Adjust the core of **L21** (C2) for minimum audio output from speaker. This minimum setting should lie between two maximum audio peaks.
- 5.—Connect damping unit between chassis and control grid (pin 2) of **V3**. Adjust output of signal generator to give a meter reading of 1 V.
- 6.—Adjust the core of **L16** (G4) for maximum output on meter. Disconnect damping unit.
- 7.—Connect damping unit between chassis and anode (pin 6) of **V2b**. Adjust the core of **L17** (B2) for maximum output on meter. Remove damping unit.
- 8.—Transfer signal generator leads to F.M. aerial sockets. Connect damping unit between chassis and control grid (pin 2) of **V2b**. Adjust output of signal generator to give a reading of 1 V.
- 9.—Adjust the core of **L7** (H4) for maximum output on meter. Remove damping unit.
- 10.—Connect damping unit between chassis and anode (pin 1) of **V1b**. Adjust the core of **L8** (B2) for maximum output on meter. Remove damping unit.
- 11.—Repeat operations 3-10 with signal generator output connected to F.M. aerial sockets.
- 12.—Tune signal generator from 10.5 Mc/s to 10.9 Mc/s and check that the response is symmetrical about the centre frequency of 10.7 Mc/s.

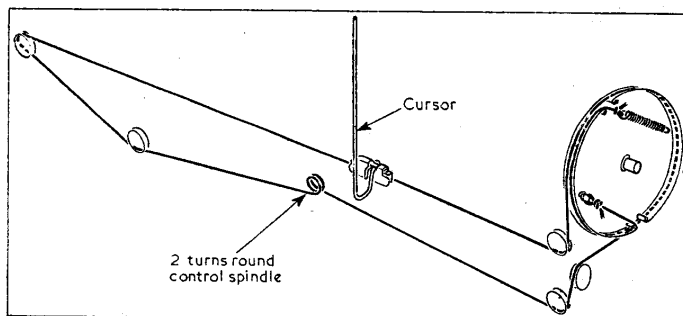
### F.M. R.F. and Oscillator Stages

- 13.—Tune receiver to 88 Mc/s. and with signal generator connected to F.M. aerial sockets, feed in an 88 Mc/s unmodulated signal and adjust cores of **L5** (A2) and **L3** (A2) for maximum output on meter.



Appearance of the Ambassador PRG/AFM.

Sketch of the tuning drive system as seen from the front of the chassis with the gang at maximum.



- 14.—Tune receiver to 96 Mc/s, feed in an unmodulated 96 Mc/s signal and adjust **C13** (J4) and **C6** (J4) for maximum output on meter.
- 15.—Connect valve voltmeter between chassis and tapping on **L3** (J4).
- 16.—Adjust **C9** (J4) for minimum reading on valve voltmeter. Disconnect valve voltmeter.
- 17.—Repeat operations 13 and 14. Tune receiver to 94 Mc/s, feed in an unmodulated 94 Mc/s signal and adjust the core of **L2** (A2) for maximum output on meter.
- 18.—Disconnect voltmeter and signal generator.

#### A.M. I.F. Stages

- 19.—Switch receiver to M.W. and turn gang to maximum. Connect a shorting link across **C27** (A1).
- 20.—Connect output of signal generator between chassis and control grid (pin 2) of **V2b**. Feed in a 30% modulated 470 kc/s signal and adjust the cores of **L24** (C2), **L23** (G4), **L19** (B2) and **L18** (G4) for maximum output.
- 21.—Repeat the adjustments in operation 20 until no further improvement results.

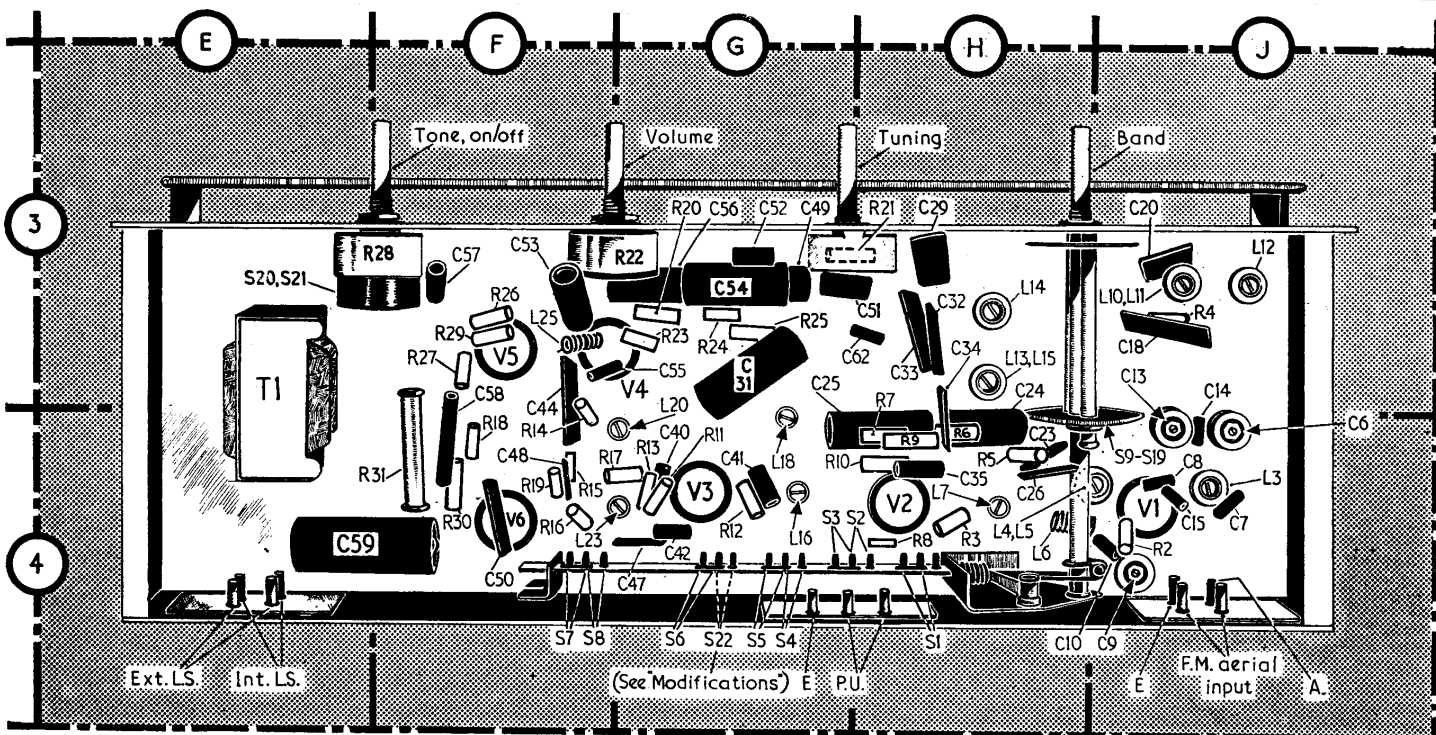
#### A.M. R.F. and Oscillator Stages

- 22.—Transfer signal generator leads to **A** and **E** sockets. For all the following operations use a 30% modulated signal.

- 23.—Feed in a 470 kc/s signal and adjust the core of **L9** (mounted in cabinet) for minimum output.
- 24.—Switch receiver to L.W. and tune to 1,800m. Feed in a 166.6 kc/s signal and adjust the cores of **L14** (B1) and **L12** (J3) for maximum output.
- 25.—Tune receiver to 1,200m., feed in a 250 kc/s signal and adjust **C30** (B1) and **C19** (A1) for maximum output.

- 26.—Repeat operations 24 and 25 until no further improvement results.
- 27.—Switch receiver to M.W. and tune it to 500m. Feed in a 600 kc/s signal and adjust the cores of **L13** (B2) and **L11** (J3) for maximum output.
- 28.—Tune receiver to 200 m, feed in a 1,500 kc/s signal and adjust **C28** (B1) and **C21** (A1) for maximum output.
- 29.—Repeat the adjustments in operations 27 and 28 until no further improvement results.

#### ADDITIONAL NOTES AND MODIFICATIONS



Underside illustration of chassis. The A.M./F.M. change-over switch contacts are identified in F4, G4, H4.